

### **REMARKS**

Claims 37-53 are pending in this application. By this Amendment, the specification, the abstract, and claims 37-53 amended. The specification and abstract are amended to correct typographical errors and to address an objection to the specification. Claims 37, 40 and 52 are amended to address claim objections. Additionally, claims 37-53 are amended to remove reference numbers to the drawings, to replace the phrase “characterized in that” with the word “wherein”, and to correct grammatical and typographical errors therein.

No new matter is added to the application by this Amendment. The features added to claim 37 find support in the Abstract and claims 43 and 52 and within the specification, as originally filed, at, for example, the paragraph bridging pages 2 and 3. The new features added to claim 40 find support in FIGS. 2 and 4, as originally filed.

Reconsideration of the application is respectfully requested.

#### **I. Specification Objections**

##### **A. Abstract**

The Patent Office objected to the Abstract for alleged informalities. This objection is respectfully traversed.

Specifically, the Patent Office objected to the Abstract because of the use of the open ended phrase “comprising”. The Patent Office also requests that “1.3” in line 5 of the Abstract be corrected to read “1.3 liter” and that “3.5” in line 9 of the Abstract be amended to read “3.5 g”.

Applicants submit herewith, on a separate sheet, a revised Abstract removing the open

ended phrase and making the corrections to read “1.3 L” and “3.5 g” as requested by the Patent Office.

Applicants submit that the revised Abstract overcomes the objections by the Patent Office.

Accordingly, the objections to the Abstract should be withdrawn.

**B. Written Description**

The specification was objected to for alleged informalities because the specification allegedly fails to include section headings therein. This objection is respectfully traversed.

The specification was amended, as suggested by the Patent Office, to include section headings, such as “BACKGROUND,” “SUMMARY,” “BRIEF DESCRIPTION OF DRAWINGS,” and “DETAILED DESCRIPTION OF THE INVENTION.”

As such, withdrawal of the objections to the specification is respectfully requested.

**II. Claim Objections**

Claims 37, 40 and 52 were objected to for alleged informalities. These objections are respectfully traversed.

Regarding claim 37, the Patent Office suggests replacing (a) the phrase “capable of” with the phrase “adapted for”, (b) the word “capitalist” with the word “catalyst”, and (c) the number “1.3” with the phrase “1.3 liter”.

Regarding claim 40, the Patent Office suggests replacing the word “pre--catalysts” with the word “pre-catalyst”.

Regarding claim 52, the Patent Office suggests replacing the phrase “capable of” with the

phrase “adapted for”.

Applicants amended claims 37, 40 and 52 as recommended by the Patent Office.

In view of the amendments to claims 37, 40 and 52, Applicants submit that the claim objections are moot.

Accordingly, withdrawal of the objections to the claims is respectfully requested.

### **III. Rejection Under 35 U.S.C. 103**

Claims 37-53 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,802,845 to Abe et al. (hereinafter “Abe”). This rejection is respectfully traversed.

Prior to discussing the merits of the Examiner's position, the undersigned reminds the Examiner that the determination of obviousness under § 103(a) requires consideration of the factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1 [148 USPQ 459] (1966): (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of nonobviousness. *McNeil-PPC, Inc. v. L. Perrigo Co.*, 337 F.3d 1362, 1368, 67 USPQ2d 1649, 1653 (Fed. Cir. 2003). There must be some suggestion, teaching, or motivation arising from what the prior art would have taught a person of ordinary skill in the field of the invention to make the proposed changes to the reference. *In re Fine*, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). But see also *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007).

A methodology for the analysis of obviousness was set out in *In re Kotzab*, 217 F.3d 1365, 1369-70, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000) A critical step in analyzing the

patentability of claims pursuant to section 103(a) is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher."

It must also be shown that one having ordinary skill in the art would reasonably have expected any proposed changes to a prior art reference would have been successful. *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d 1200, 1207, 18 USPQ2d 1016, 1022 (Fed. Cir. 1991); *In re O'Farrell*, 853 F.2d 894, 903-04, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988); *In re Clinton*, 527 F.2d 1226, 1228, 188 USPQ 365, 367 (CCPA 1976). "Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant's disclosure." *In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988).

The Patent Office acknowledges that Abe fails to disclose that the engine installation is a directly injected gasoline type engine which is adapted for operating in a stratified manner only slightly if at all. The Patent Office alleges that it would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the invention of Abe to a directly injected gasoline type engine, since the recitation of such amounts to an intended use statement. Additionally, the Patent Office alleges that both "directly injected gasoline engine" and "carburetor gasoline engine" generate exhaust gases containing harmful emissions of HC, NOx, soot, CO, etc, that require purification before the gases can be released to the atmosphere;

and the mere selection of the purification system of Abe for use in a directly injected gasoline engine would be well within the level of ordinary skill in the art. Applicants respectfully disagree with each of these allegations made by the Patent Office.

Amended claim 37 requires an internal combustion engine installation having a directly injected gasoline engine, which is not adapted for operating in a stratified manner or is adapted for operating in a stratified manner only to a small extent in terms of all operation points of the direct injected gasoline engine, and a catalyst system, which is downstream from the directly injected gasoline engine and has at least one catalyst. The catalyst system of claim 37 has (a) a total catalyst volume (KV) of less than  $0.8 \times$  the engine displacement (VH) or of less than 1.3 L per 100 kW of rated horsepower (PNENN), (b) an average specific noble metal loading of the at least one catalyst of the catalyst system that is less than  $3.59 \text{ g/dm}^3$ , and (c) a total mass of noble metal of the catalyst system being less than 2 g per liter of the engine displacement (VH) or less than 3.5 g per 100 kW of rated horsepower (PNENN) of the gasoline engine.

The present claims are directed to an internal combustion engine installation requiring a directly injected gasoline engine which is not adapted for operating in a stratified manner or is adapted for operating in a stratified manner only to a small extent in terms of all operation points of the direct injected gasoline engine. The recitation of the directly injected gasoline engine is not merely an intended use statement as alleged by the Patent Office. Instead, the directly injected gasoline engine is a required feature of claim 37. Thus, as acknowledged by the Patent Office, Abe fails to teach or suggest a directly injected gasoline engine, which is not adapted for operating in a stratified manner or is adapted for operating in a stratified manner only to a small

extent in terms of all operation points of the direct injected gasoline engine, as specifically defined in claim 37.

With respect to the Patent Office's allegation that it would have been obvious to a skilled artisan to apply the invention of Abe to direct injection engines not (or almost not) being capable of stratified operation, Applicants submit that each engine type requires a specific catalyst system because each engine type produces a different amount of harmful exhaust gas as well as different relations of harmful exhaust gas components. The present invention provides a catalyst system for this special direct injected gasoline engine type, which, at the time the invention was made, would have been equipped with exhaust gas systems having larger total catalyst volumes and higher loadings of noble metals as compared to the presently claimed catalyst system having a total catalyst volume (KV) of less than  $0.8 \times$  the engine displacement (VH) or of less than 1.3 L per 100 kW of rated horsepower (PNENN), an average specific noble metal loading of the at least one catalyst of the catalyst system that is less than  $3.59 \text{ g/dm}^3$ , and a total mass of noble metal of the catalyst system being less than 2 g per liter of the engine displacement (VH) or less than 3.5 g per 100 kW of rated horsepower (PNENN) of the gasoline engine .

The engine according to Abe can be equipped with various types of catalyst systems, including at least one catalyst (catalyst A, optionally catalysts B and C) and at least one adsorbent (see FIGS. 4-11) and may include an electric heater catalyst (hereinafter "EHC") (see Figures 5-11). The EHC 7 is a electric heater coated with the catalyst layer comprising a heat-resistant inorganic oxide containing at least a noble metal whereby electric power required to heat the heater can be decreased with the aid of the reaction heat of the catalyst (see col. 7, lines

23-30 and col. 13, lines 22-50). Additionally, the absorbent of Abe is provided with a catalytic coating (see col.12, line 62 – col. 13, line 21). Specifically, Abe teaches that the amount of the supported Pd in the absorbent A was 10 g/ft<sup>3</sup> (see col. 13, lines 12 and 13). Abe also teaches that the amount of supported noble metals in the catalyst layer of the absorbent B was 80 g/ft<sup>3</sup> (see col. 13, lines 20 and 21). Thus, both the absorbent and the EHC must be considered to have catalytic activity and must be allocated to the catalytic system in the meaning of claim 37.

Concerning the total catalyst volume according to feature (a) of the catalyst system of claim 37, Abe discloses only for catalyst A to have a volume in the range of 0.5 to 4 of the displacement of the engine (see col. 9, lines 61-63). However, Abe does not disclose the relation of the total catalyst volume of all catalytic components, which also includes the absorbent and the EHC, to the engine displacement. Thus, Applicants submit that Abe fails to teach or suggest the total catalyst volume (KV) to be less than 0.8 x engine displacement (VH) or to be less than 3.5 g per 100 kW of rated horsepower (PNENN) of the gasoline engine as required by claim 37.

The Patent Office alleges that Abe discloses a total mass of noble metal of the at least one catalyst being less than 2 g per liter of engine displacement (VH). However, the Patent Office fails to identify what passages, if any, in Abe support this allegation. Contrary to the Patent Office's allegations, Abe is silent to a total mass of noble metal of the catalyst system as required by feature (c) of the catalyst system according to claim 37.

Although Abe is silent to the total mass of noble metal for entire catalyst system, Abe discloses catalyst A contains 80 g/ft<sup>3</sup> noble metals and has a volume of 3.4 L (col. 12, line 55-61), which is equivalent to a mass of 9.6 g noble metals. In addition, the absorbent of Abe has a

volume of 1.2 L and contains 10 g/ft<sup>3</sup> Pd for Absorbent A, which is equivalent to a mass of 0.4 g noble metals or contains 80 g/ft<sup>3</sup> Pt/Pd/Rh for Absorbent B, which is equivalent to a mass of 3.4 g of noble metals (see col. 13, lines 7-22). Thus, the catalyst system of FIG. 4 has a total mass of noble metals of 10.0 g (when including Absorbent A) or 13.0 g (when including Absorbent B). Only an engine having a displacement of more than 5 liters which is very uncommon or not available at all would fulfill the requirement of present feature (c).

The total mass of noble metals for the catalyst systems of FIGS. 5-11 is even greater than the total mass of noble metals for the catalyst system of FIG. 4 because additional catalytic components (i.e., catalyst B: 3.4 g of noble metals, catalyst C: 0.6 g noble metals, and EHC: 0.4 g of noble metals) are provided in the catalyst systems of FIGS. 5-11. Thus, Abe fails to disclose the total mass of noble metal of the at least one catalyst of the catalyst system to be less than 2 g per liter engine displacement (VH) or less than 3.5 g per 100 kW of rated horsepower (PNENN) of the gasoline engine as recited in claim 37.

Thus, Abe fails to teach or suggest a directly injected gasoline engine which is not adapted for operating in a stratified manner or is adapted for operating in a stratified manner only to a small extent in terms of all operation points of the direct injected gasoline engine as recited in claim 37. Abe also fails to teach or suggest a catalyst system having a total catalyst volume (KV) of less than 0.8 x the engine displacement (VH) or of less than 1.3 L per 100 kW of rated horsepower (PNENN), and a total mass of noble metal of the catalyst system being less than 2 g per liter of the engine displacement (VH) or less than 3.5 g per 100 kW of rated horsepower (PNENN) of the gasoline engine as required by claim 37.



Because these features of independent claim 37 are not taught or suggested by Abe, this reference would not have rendered the features of independent claim 37 and its dependent claims obvious to one of ordinary skill in the art.

For at least these reasons, claims 37-53 are patentable over Abe. Thus, withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested.

#### **IV. Conclusion**

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 37-53 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Early and favorable action is earnestly solicited.

#### **CONDITIONAL PETITION FOR EXTENSION OF TIME**

If entry and consideration of the amendments above requires an extension of time, Applicants respectfully request that this be considered a petition therefor. The Commissioner is authorized to charge any fee(s) due in this connection to Deposit Account No. 14-1263.

**ADDITIONAL FEE**

Please charge any insufficiency of fees, or credit any excess, to Deposit Account No. 14-1263.

Respectfully submitted,  
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